Revisiting the 2003 Mercury Strategy for the Bay-Delta Ecosystem
January 26 – 28, 2016
Cal EPA Building, Klamath Room
1001 I Street, Sacramento, CA

Workshop Purpose

To create a shared understanding of the current knowledge of mercury science among scientists and managers invested in the San Francisco Bay-Delta system. The workshop will assess the progress made toward achieving the recommendations outlined in the 2003 Mercury Strategy and provide an update of recent and ongoing scientific studies in the region. The information presented will address challenges associated with mercury contamination in the Bay-Delta ecosystem including the identification of critical uncertainties and associated priorities for research, monitoring, and evaluation. The resulting workshop summary will inform managers towards the goal of identifying and selecting management actions to address mercury pollution.

Workshop Format

The workshop will consist of three 1-day themed workshops in January consisting of technical presentations during the morning session and a facilitated discussion during the afternoon session. A synthesis workshop will be held in June that will consist of summary presentations of findings from the January technical workshops during the morning session and a facilitated discussion of the synthesis during the afternoon session. There will also be posters on display throughout the workshop series to promote discussion among workshop participants.

Products

1) Updated publication (SFEWS) on mercury strategy for the SF Bay-Delta System
2) Presentation at Bay-Delta Science Conference (November 15-17, 2016)

Independent Science Panel

David Krabbenhoft, Ph.D., USGS
Cynthia Gilmour, *Ph.D.,* Smithsonian Environmental Research Center
Karen Kidd, *Ph.D.,* University of New Brunswick

Workshop 1: Sources, January 26, 2016

WORKSHOP LEAD

Jacob Fleck, USGS California Water Science Center

Morning Session

8:30– 9:00 **Sign-in and poster viewing (coffee served)**

9:00 -9:30 **Workshop introduction: Revisiting the 2003 Strategy and conceptual models**
Jacob Fleck (USGS California Water Science Center)

This presentation will provide an introduction to the workshop series and specific issues to be addressed in the sources workshop. The speaker will review the 2003 Strategy effort and recommendations and provide context for the workshops' presentations and posters using the box models for the San Francisco Bay and the Sacramento-San Joaquin Delta as conceptual frameworks for the discussion.

9:30 – 10:00 **Mine source remediation in the San Francisco Bay-Delta Watershed**
Carrie Austin (San Francisco Regional Water Quality Control Board)

This presentation will provide a review of mine and mine-affected landscape remediation efforts in Sierra and Coast Ranges. The speaker will propose a ranking system for prioritizing mine remediation and provide a case study of remediation effectiveness.

10:00 – 10:30 **Concentrations and loads of mercury and methylmercury from urban tributaries of San Francisco Bay, California**
Lester McKee, Don Yee*, Alicia Gilbreth (San Francisco Estuary Institute)

This presentation will provide new information from a large study quantifying and characterizing urban tributary loads to San Francisco Bay. The speaker will present the study design and major findings and provide context using the conceptual (box) model for the San Francisco Bay and relate the findings to potential effects in the Delta.

*presenting

10:30 – 11:00 **Mercury transport in tidal systems: measuring loads and processes**
Brian Bergamaschi (USGS California Water Science Center)

This presentation will provide a general introduction to methods of flux measurements in tidal systems. The speaker will provide an overview of mercury fluxes in tidal wetlands from the Delta and beyond. The speaker will also discuss processes affecting tidal exchange in the San Francisco Bay-Delta for an improved understanding of the system.

11:00 – 11:30 **Comparison of Mercury Mass Loading in Streams to Atmospheric Deposition in Watersheds in the Western US: Evidence for Non-Atmospheric Mercury Sources**
Joe Domagalski (USGS California Water Science Center)

This presentation will summarize the results of a recent study that used long term flow and mercury data in tributaries to the San Francisco Bay and other Western watersheds to compare the delivery of

Hg from a variety of mine-affected to pristine watersheds. Comparisons were made between atmospherically deposited Hg on the watersheds to stream export.

11:30 – 12:00 **The use of the natural abundance of stable Hg isotopes to determine the relative contribution of Hg sources to sediment and biota in the San Francisco Bay Delta system.**
Joel Blum (University of Michigan)

This presentation will provide an introduction to the use of naturally abundant stable Hg isotope ratios to determine the relative contribution of mercury sources to sediment and biota. The speaker will discuss previous and ongoing studies in the San Francisco Bay Delta watershed.

12:00 – 12:30 **The Role of Modeling the Delta's Open Water's MeHg Supply—Insights and Knowledge Gaps**
Carol DiGiorgio (Department of Water Resources) and Reed Harris (Reed Harris Environmental Ltd.)

The presenters will provide an overview of their experiences in an ongoing project to create numerical models of mercury cycling in the Delta and Yolo Bypass. The models are based on the Delta Simulation Model Version 2 (DSM2) and the Dynamic Mercury Cycling Model (D-MCM). It is hoped that these models will be robust enough to use to evaluate the effects of water management on mercury cycling in the Delta and Yolo Bypass. The speakers will present an overview of the models and identify important features of the Delta and Yolo Bypass from a mercury modeling perspective as well as summarize their experience in obtaining and evaluating data to apply to the models.

12:30-1:30 LUNCH and POSTER SESSION

<u>Afternoon Session</u>

1:30-4:30 **Facilitated discussion** (Juliana Birkhoff, Center for Collaborative Policy, California State University Sacramento)

The discussion will be guided through a series of statements presented as slides by the workshop lead with supporting information embedded in the slides. Several discussion statements will be prepared ahead of time based on the topics addressed in the morning session and literature review. Workshop participants are encouraged to provide additional statements or questions during the morning session (via notecards – submitted to the facilitator by the lunch break). The participants will vote on their agreement or disagreement with the statements, which will provide the basis for a follow-up discussion on points where there is disagreement among the participants. Following the discussion (limited to approximately 30 min per statement/topic), the participants will vote again. Quantification of the level of agreement on these statements will provide a basis for the evaluation of progress made on the 2003 Strategy's recommendations, levels of confidence in the responses and where more work is needed to either settle disagreement or to address a lack of data on a particular topic.

WORKSHOP 2: Biogeochemistry, January 27, 2016

WORKSHOP LEAD

Lisamarie Windham-Myers (USGS, National Research Program, Menlo Park)

Morning Session

8:30– 9:00 Coffee/sign-in/poster previews

9:00 - 9:30 **Workshop introduction**
Lisamarie Windham-Myers

This presentation will introduce the goals and background for the biogeochemistry-focused session (Day 2) of the RDMS workshop series. This review will place biogeochemistry in a conceptual framework for the discussion related to following presentations and posters

9:30 – 10:00 **Controls on mercury methylation**
Mark Marvin-DiPasquale (USGS National Research Program, Menlo Park, CA)

This presentation will both 1) review current understanding of the principle controls on mercury methylation within the SFB-Delta watershed, and 2) discussion management options for minimizing MeHg production and export.

10:00 – 10:30 **Role of dissolved organic matter in mercury cycling**
George Aiken (USGS National Research Program Boulder, CO)

This presentation will provide an overview of Hg-OM interactions and how they affect Hg methylation, transport and bioaccumulation within the SFB-Delta.

10:30 – 11:00 **Overview of mercury cycling in rice agriculture**
Jacob Fleck (USGS California Water Science Center)

This presentation will present an overview of Hg biogeochemistry as observed in rice fields across the SFB-Delta. Using unique hydrologic constraints and management conditions, rice field studies have identified both consistent and unique processes that need to be incorporated into wetland Hg models and used to address potential management practices.

11:00 – 11:30 **Yolo polishing ponds and mesocosms**
Wes Heim (Moss Landing Marine Laboratory)

This presentation summarizes multiple studies from the Yolo Bypass on the use of "polishing ponds" to control MeHg loading from seasonally flooded wetland systems.

11:30 – 12:00 **Mercury control study: Coagulation techniques**
Tamara Kraus (USGS California Water Science Center)

This presentation summarizes results of field and laboratory MeHg coagulation studies, as a potential technique for aqueous MeHg removal in the context of Delta MeHg remediation strategies.

12:00 – 12:30 **Overview of control studies for the Delta MeHg TMDL**

Stephen McCord (McCord Environmental)

This presentation summarizes the NPS Workgroup's prioritized management practices, control studies, and challenges addressing the Delta MeHg TMDL.

12:30 – 1:30pm LUNCH and POSTER SESSION

Afternoon Session

1:30-4:30 **Facilitated discussion** (Juliana Birkhoff, Center for Collaborative Policy, California State University Sacramento)

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WORKSHOP 3: Bioaccumulation, January 28, 2016

WORKSHOP LEADS

Josh Ackerman (USGS Western Ecological Research Center), Collin Eagles-Smith (USGS, Forest and Rangeland Ecosystem Science Center)

Morning Session

8:30– 9:00 Coffee/sign-in/poster previews

9:00 – 9:30 **Linking Biogeochemical Parameters to Biological Mercury Exposure**
Collin Eagles-Smith (USGS, FRESC)

This presentation summarizes the goals of today's workshop and biogeochemical linkages to biota between environmental mercury contamination and bioaccumulation, and emphasizes the heterogeneity of mercury in the environment and the decoupling of methylmercury in biological endpoints.

9:30 – 10:00 **Overview of Mercury Risk to Wildlife and Factors Influencing Risk**
Josh Ackerman (USGS, WERC)

This presentation summarizes the current state of knowledge on the risk of mercury to wildlife in the Bay-Delta, and factors influencing risk.

10:00 – 10:30 **Mercury in Base of Food Web and Biomagnification**
Robin Stewart (USGS National Research Program)

This presentation describes our current understanding of how methylmercury enters base of food web, is transferred to higher trophic levels, and how certain factors (e.g., food web structure, nutrient status) may influence these processes and ultimately the risk of mercury to biota.

10:30 – 11:00 **How the Regional Monitoring Program Integrates Mercury Science into Monitoring**
Jay Davis (San Francisco Estuary Institute)

This presentation summarizes the sport fish methylmercury monitoring program for the Bay-Delta, long-term trends, human health, how this monitoring program is integrated with science, and an assessment of progress made towards completing the sport fish monitoring program objectives.

11:00 – 11:30 **Spatial and Temporal Trends in Fish Mercury**
Darell Slotton (UC Davis)

This presentation summarizes the historical knowledge of fish mercury concentrations in the Bay-Delta and its extensive watershed, annual variability, seasonal variability, and mercury concentrations in relation to regulatory target criteria, with an assessment of using the mean fish mercury concentration for regulatory policy when individual variability may be high.

11:30 – 12:00 **Integrating Mercury Science into Regulation**
Janis Cooke (Central Valley Regional Water Quality Control Board)

This presentation summarizes how the Water Board has mathematically incorporated fish and wildlife methylmercury concentrations and risk into the Delta mercury control program and other regulatory policies.

12:00 – 1:00pm LUNCH and POSTER SESSION

Afternoon Session

1:00-4:00 **Facilitated discussion** (Juliana Birkhoff, Center for Collaborative Policy, California State University Sacramento)

The discussion will be guided through a series of statements presented as slides by the workshop lead with supporting information embedded in the slides. Several discussion statements will be prepared ahead of time based on the topics addressed in the morning session and literature review. Workshop participants are encouraged to provide additional statements or questions during the morning session (via notecards – submitted to the facilitator by the lunch break). The participants will vote on their agreement or disagreement with the statements, which will provide the basis for a follow-up discussion on points where there is disagreement among the participants. Following the discussion (limited to approximately 30 min per statement/topic), the participants will vote again. Quantification of the level of agreement on these statements will provide a basis for the evaluation of progress made on the 2003 Strategy's recommendations, levels of confidence in the responses and where more work is needed to either settle disagreement or to address a lack of data on a particular topic.

4:00 – 4:30 **Recap of the Workshops and a statement from the Independent Science Panel**

Workshop leads will recap the main points of each workshop followed by reflections from the Independent Science Panel members.